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SOME USTILAGINEAE OF THE STATE OF WASHINGTON

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INTRODUCTORY STATEMENT

No special effort has previously been made to list the Ustilagineae of Washington. Scattered through literature, however, there are a fairly large number of reports of smuts from Washington. It would be hard to find another state where more ideal conditions for mycological study exist, especially for the study of smuts and rusts. The state has an area of 69,180 square miles and a coast line of 1,860 miles, together with a varied topography and a climate ranging from one warm enough to raise figs to that of a very frigid character, and a variation of rainfall from less than 5 inches to over 130 inches, the fungous flora of the state is naturally varied.

Of the botanical collectors who have worked in the state a large proportion have found smuts. Among them are W. N. Suksdorf, David Griffiths, T. E. Wilcox, E. R. Lake and W. R. Hull, J. S. Cotton, R. M. Horner, C. V. Piper, R. K. Beattie. For the last five years the Plant Disease Survey of Washington, under the direction of Dr. F. D. Heald, has added to the smut collections of the state. Mr. W. N. Suksdorf has, perhaps, contributed most to our knowledge of Washington smuts. His collecting has been confined, however, to small areas, in Klickitat and in Skamania Counties, so that there are still counties in the state from which not a single smut has been reported. Mr. Suksdorf has also collected on Mt. Adams (Mt. Paddo, used by Suksdorf, is the old Indian name for Mt. Adams).

SOURCE OF MATERIAL

The smuts reported in this list represent material from a number of sources.

(a) References taken from literature but no specimens examined.

(b) Specimens examined from various herbaria.

(c) Specimens sent to the author mostly by W. N. Suksdorf.

(d) Material in the herbaria of the department of botany and of the department of plant pathology of the State College of Washington. A number of these collections were found by reference to the "Parasitic Fungi of the Northwest" by Martin, now in process of publication.

(e) The author's own collection. Where no credit is given it is the author's own collection.

The writer has used the nomenclature of Clinton as it appears in North American Flora.

LIST OF SPECIES

Arranged alphabetically for Genus, Species, and Host.

CINTRACTIA CARICIS (Pers.) Mag. Abh. Bot. Ver. Prov. Brand., 37: 79. 1896.

On *Carex geyeri*, Mt. Adams (Mt. Paddo), Wash. Sept. 21, 1899 (W. N. Suksdorf, No. 554).

On *Carex* sp., Mt. Adams (Mt. Paddo), Wash. Aug. 11, 1885 (W. N. Suksdorf, No. 188).

CINTRACTIA SEYMORIANA Mag.

On *Panicum crus-galli*, Bingen, Klickitat Co., Wash. Oct. 3, 1894 (W. N. Suksdorf, No. 404). This name is now considered as a synonym of *Ustilago crus-galli*.

DOASSANSIA ALISMATIS (Nees) Cornu. Ann. Sci. Nat. VI. 15: 285. 1883.

On *Alisma plantago*, Columbia River, W. Klickitat Co., Wash. May 23, 1884 (W. N. Suksdorf No. 165 as per letter of Jan. 13, 1920, from Dr. G. P. Clinton); Pullman, Whitman Co., Wash. Aug. 20, 1894 (Piper, No. 278, W. S. C. Herbarium).

DOASSANSIA MARTIANOFFIANA (Thüm) Schrot. Krypt. Fl. Schles., 3: 287. 1887.

On *Potamogeton gramineus*, Falcon Valley, Klickitat Co., Wash. Aug. 1885 (W. N. Suksdorf No. 205 as per letter from Dr. G. P. Clinton of Jan. 13, 1920).

ENTYLOMA ARNICALE El. & Ev. Bull. Torr. Bot. Club, 22: 57. 1895.

Type collected in Skamania County, Wash.—on leaves of *Arnica chamissonis*, 1891. Other collections on leaves of *Arnica cordifolia*, Latah County, Idaho, July 1893 (C. V. Piper No. 122).

ENTYLOMA COMPOSITARUM Farl. Bot. Gaz., 8: 275. 1883.

On *Amsinkia intermedia*, Waitsburg, Walla Walla Co., Wash. May 28, 1900 (Horner, No. 1468—W. S. C. Herbarium).

On *Erigeron elatus* and *E. soluginosus* (North American Flora, 7: pt. 1, p. 62).

SPACELOTHECA REILIANA (Kühn) Clint. Jour. Myc., 8: 141. 1902.

On *Zea mays*—20 acre patch north of Wash. State College, Pullman.

Whitman County, Wash.—40 per cent. infection mostly in tassel, Sept. 12, 1919 (Zundel and Williams). On Wash. State College Farm, Oct. 1919 (Dana).

SPACELOTHECA SORGHII (Link) Clint. Jour. Myc., 8: 140. 1902.

On *Sorghum* sp. (cultivated), Forage nursery Washington State College, Pullman, Whitman Co., Wash. Sept. 10, 1915 (Heald and George C. S. No. 238); Yakima, Yakima Co., Wash. Oct. 10, 1918 (E. C. Scott, I. S. No. 1708); near Chelan, Chelan Co., Wash. Summer 1918.

TILLETIA ASPERIFOLIA El. & Ev. Jour. Myc., 3: 55. 1887.

On *Sporobolus asperifolius*, Rockland, Klickitat Co., Wash. June 3, 1905 (W. N. Suksdorf No. 998); Yakima, Yakima Co., Wash. Aug. 1895 (Watt, W. S. C. Herbarium).

TILLETIA ELYMI Diet. & Hol. Bot. Gaz., 19: 305. 1894.

On *Elymus* sp., Skamania Co., Wash. Aug. 13, 1886. Type collection (W. N. Suksdorf No. 336).

TILLETIA FOETENS (B. & C.) Trel. Par. Fungi. Wis. 35. 1884.

Collected on *Triticum* sp.—in Thurston Co., Grays Harbor Co., Island Co., and Lincoln Co., Wash. Summers of 1918–1919. The one sample from Lincoln County in 1919 is the only one known to have been collected in Washington, east of the Cascade Mountains.

TILLETIA FUSCA El. & Ev. P. B. I. Bull., 38: 43. 1903; Jour. Myc., 3: 55. 1887.

On *Festuca microstachys* and *F. octiflora*, 25 miles north of Prosser, Benton Co., Wash. Summer 1903 (David Griffiths). Fully three-fourths of all plants had been destroyed by the smut; Rattlesnake Mountains, Yakima Co., Wash. June 18, 1901 (J. S. Cotton in Flora of Yakima Region, 1901).

TILLETIA GUYOTIANA Har. Jour de Botanique, 1900: 117. 1900.

Syn. *Thecophora guyotiana* Har. Mem. Soc. Acad. de l'Aube, 1887: 195. 1887.

Sori replacing ovaries, somewhat flexible. Spores enmasse reddish-brown, spores yellowish, clear, globose, roughly elliptical, very elegantly reticulated. 19–25 μ diam.

On *Bromus hordaceus glabrescens*,

(a) Wedgewood Bros. Farm, Goldendale, Klickitat Co., Wash. Aug. 12, 1919 (Zundel & Cooney). Elevation 2200 ft.

(b) Three miles west of Goldendale, Klickitat Co., Wash. Aug. 12, 1919. Elevation 1900 ft.

(c) South end of Trout Lake, Klickitat Co., Wash. Aug. 13, 1919.

(d) White Salmon, Klickitat Co., Wash. Aug. 13, 1919.

(e) Staker's Canyon, Klickitat Co., Wash. Aug. 14, 1919.

(f) Seven miles east of Dixie, Walla Walla Co., on the foothills of the Blue Mountains. Sept. 28, 1919 (Zundel & Patton).

So far as the writer has been able to ascertain this is the first time that this smut has been reported from North America. Plants were found that were smutted with both *Ustilago bromivora* and *Tilletia guyotiana*. It is very abundant on the foothills of the Blue Mountains of Washington and all over Klickitat County, Wash. It is very inconspicuous and not easily found unless one knows exactly what to look for. The writer first found his specimen

when opening a gate for County Agent Cooney of Klickitat Co., when going into a wheat field. A piece of brome grass was picked and the kernel smashed. A dark dusty mass fell into his hand and a careful examination resulted in the finding of this smut.

TILLETIA RAUWENHOFFII Fisch. de Wald. *Aperçu*, p. 50.

Syn. *Tilletia holci* (West) Rost. Danish Fungi by J. Lind., 1913: 266. 1913.

Sori irregular, in ovary of host, dark, spores reticulate, in two layers. An inner layer olive brown, an outer layer visible on the periphery of the spores, hyaline, side hexagonal, not very prominent hexagonal reticulations. Spores 22–30 μ diam.

On *Holcus lanatus*, Kelso, Cowlitz Co., Wash. Aug. 6, 1919.

Five collections at Kelso, Wash. Aug. 17, 1919. Not very abundant. This smut has previously been reported from Belgium and Denmark. So far as the writer is aware this is the first report of this smut from North America.

TILLETIA TRITICI (Bjerk.) Wint. Rab. Krypt. Fl., 11: 110. 1881.

On kernels of wheat, Bingen, Klickitat Co., Wash. Aug. 3, 1902 (W. N. Suksdorf No. 996).

Found on *Triticum* spp.—in every county of Washington. Most abundant in the Palouse region of eastern Washington. Causes an annual loss in the state of about \$5,000,000.00.

USTILAGO AVENAE (Pers.) Jens. Charb. Céréales, 4. 1889.

On *Avena sativa*, Prevalent west of Cascade Mountains, rarely found east of the Cascade Mountains.

USTILAGO BISTORTURUM (DC.) Körn. Hedwigia, 16: 38. 1877.

On *Polygonum* sp., Mt. Adams (Mt. Paddo), Wash. Aug. 7, 1885 (W. N. Suksdorf No. 198).

USTILAGO BROMIVORA (Tul.) Fisch. de Wald.—Bull. Soc. Nat. Mosc., 40: 252. 1867.

On *Bromus eximius*, West of Ice Cave, Skamania Co., Wash. Sept. 9, 1902 (W. N. Suksdorf No. 1021).

On *Bromus hookerianus*, on banks of Columbia River, Klickitat Co., Wash. June 1883 (W. N. Suksdorf No. 66).

On *Bromus hordaceus*, Wawawai, Whitman Co., Wash. May 7, 1915 (George, W. S. C. Path. No. C. S. 26); Pullman, Whitman Co., Wash. July 1, 1915 (G. A. Olson, W. S. C. Path. No. C. S. 130); July 10, 1916 (Dana, W. S. C. Path. No. C. S. 360).

On *Bromus hordaceus glabrescens*, Coupeville, Island Co., Wash. June 19, 1919; White Salmon, Klickitat Co., Wash. Aug. 13, 1919.

On *Bromus marginatus*, Aug. 18, 1904. Wentachee Mts., Chelan County, Wash. (Cotton—W. S. C. Herbarium).

On *Bromus* sp., Colfax, Whitman Co., Wash. July 19, 1919; Rosalia, Whitman Co., Wash. Aug. 1, 1919.

On *Bromus* sp., Washington State College Campus, Pullman, Whitman Co., Wash. July 2, 1918 (W. S. C. Path. C. S. No. 516) also July 1910: Puyallup, Pierce Co., Wash. July 16, 1919; Maryhill, Klickitat Co., Wash. Aug. 12, 1919; Stacker's Canyon, Klickitat Co., Wash. Aug. 14, 1919; LaConner, Skagit Co., Wash. Aug., 1919.

USTILAGO BROMIVORA MACROSPORA Farl. Bull. Iowa Agr. Coll. Bull. Bot. Dep., 1886: 59. 1887.

On *Bromus tectorum*, Chelan Lake, Chelan Co., Wash. Aug. 27, 1916 (Weir No. 12496).

USTILAGO CLAYTONIAE C. L. Shear. Bull. Torr. Bot. Club, 34: 317. 1907.

Type collected by Colonel T. E. Wilcox on *Claytonia linearis* Dougl. Vancouver Barracks, Vancouver, Clarke Co., Wash. Apr. 8, 1903; Campus Wash. State College, Pullman, Whitman Co., Wash. May 14, 1920 (Sullins & Zundel).

USTILAGO CRUS-GALLI. Tr. & Ear. Bull. Tor. Bot. Club, 22: 175. 1895.

On *Panicum crus-galli*, Western Klickitat Co., Wash. (W. N. Suksdorf No. 3677, Specimen in herbarium of Dr. Jas. Weir, Spokane, Wash.).

On *Panicum milaceum* (Broom corn millet), Sunnyside, Yakima County, Wash. Oct. 19, 1915 (Heald & George No. I. S. 458).

USTILAGO ECHINATA Schröt. Abh. Schles. Ges. Abth. Nat. Med., 1869-72: 4. 1870.

On leaves of *Phalaris arundinaceae*, collected on bottom land—Bingen, Klickitat Co., Wash. June 30, 1893 (W. N. Suksdorf No. 413).

USTILAGO HORDEI (Pers.) Kel. & Sw. Ann. Rep. Kans. Agr. Exp. Sta., 2: 268. 1890.

On *Hordeum* spp. Throughout the state of Washington.

USTILAGO HYPODYTES (Schl.) Fr. B. P. I. Bull., 38: 43. 1903. Syst. Myc., 3: 518. 1832.

On *Distichlis spicata* (North Amer. Flora, 7: 5. 1906).

On *Elymus condensatus*, Okanogan, Wash. Summer, 1903 (David Griffiths).

On *Eriocoma cuspidata*, on Big Bend Land Co., Northern Franklin Co., Wash. Aug., 1919. From material sent to Dr. F. L. Pickett, of the Washington State College Botany Department; Pasco, Franklin Co., Wash. April 21, 1920, on year old stalks of the grass.

On *Sitanion* sp., Mt. Adams (called by Indians Mt. Paddo), Wash. Sept. 30, 1904 (W. N. Suksdorf No. 980); Wenatchee, Chelan County, Wash. July 17, 1919 (Leonard).

On *Stipa* sp., Falcon Valley, Klickitat Co., Wash. July 10, 1900 (W. N. Suksdorf, No. 606a), Aug. 26, 1904 (W. N. Suksdorf No. 606b).

USTILAGO LEVIS (Kel. & Sw.) Magn. Abh. Bot. Ver. Prov. Brand., 37: 69. 1896.

On *Avena fatua glabrata*, Oakesdale, Whitman County, Wash. July 29, 1919 (J. W. Hotson).

On *Avena* sp., Bingen, Klickitat Co., Wash. July 13, 1902 (W. N. Suksdorf No. 805).

This smut of oats is prevalent east of the Cascade Mountains. It is also found in western Washington (See Heald, F. D., "Oat Smuts in Washington" in Proc. Wash. State Grain Growers, Shippers and Millers Association, 1919: 29).

USTILAGO MUFORDIANA El. & Ev. Bull. Torr. Bot. Club, 22: 362. 1895.

On *Festuca microstschys* (?) or *F. reflexa* (?), Bingen, Klickitat Co., Wash. July 3, 1902 (W. N. Suksdorf No. 804).

On *Festuca tenella*, Bottom land of the Columbia River at Bingen, Klickitat Co., Wash. May 26, 1896 (W. N. Suksdorf No. 555).

USTILAGO NUDA (Jens.) Kel. & Sw. Ann. Rep. Kans. Agr. Exp. Sta., 2: 277. 1890.

On *Hordeum* spp. (cultivated), Florence and Marysville, Snohomish Co., Wash. Summer 1919.

USTILAGO PERENNANS Rostr. Overs. K. Danske Vid. Selsk. Forh., 1890: 15. March, 1890.

On *Arrhenatherum elatius* (escaped from cultivation and locally called Lincoln grass).

Wash. State College Farm, Whitman Co., Wash. May 1, 1919 (Wanser, W. S. C. Path. I. S. No. 1379); Trout Lake, Klickitat Co., Wash. Aug. 13, 1919.

USTILAGO PUNCTATA Clint. North Amer. Flora, 7: 23-24. 1906.

On *Polygonum newberryi*, Mt. Adams (Indian name, Mt. Paddo), Wash. Sept. 6, 1904 (type collection, W. N. Suksdorf No. 979).

USTILAGO STRIAEFORMIS (Westend.) Niessl. Hedwegia, 15: 1. 1876.

¹ On *Phleum pratense*, Bingen, Klickitat Co., Wash. May 21, 1896 (W. N. Suksdorf No. 532); Pullman, Whitman Co., Wash. June 21, 1916 (Heald, W. S. C. Path. No. I. S. 285); Oakesdale, Whitman Co., Wash. June 13, 1919 (C. R. Stillinger in Jas. Weir Herb., Spokane, Wash.); Washington State College Campus, east of Silver Lake, Pullman, Whitman Co., Wash. Summer 1919; Waterville, Douglas Co., Wash. June 23, 1919.

On *Poa pratense*, Washington State College Campus, East of Silver Lake, Pullman, Whitman Co., Wash. Summer 1919.

USTILAGO TRITICI (Pers.) Rostr. Overs. K. Danske Vid. Selsk. Forh., 1890: 15. March, 1890.

On *Triticum* spp., throughout the state of Washington in amounts not exceeding 5 per cent.

USTILAGO URTICULOSA (Nees.) Tul. Ann. Sci. Nat. III., 7: 102. 1847.

On *Polygonum hydropiperoides*, bottom land of the Columbia River, Bingen, Klickitat Co., Wash. Oct. 7, 1885 (W. N. Suksdorf No. 221).

USTILAGO VIOLACEAE var. *major* Clint. Jour. Myc., 8: 139. 1902.

On *Silene* sp., Mt. Adams (Mt. Paddo), Wash. Oct. 1, 1904 (W. N. Suksdorf No. 983).

On *Alsine nitans*, Wash. State College Campus, Pullman, Whitman Co., Wash. May 14, 1920.

USTILAGO WASHINGTONIANA El. & Ev. Bull. Torr. Bot. Club, 22: 57. 1895.

From collection by E. R. Lake, spring of 1892 on leaves of "some grass." The locality is not given in the article. Clinton considers this species as a synonym of *Ustilago striaeformis* (Westend.) Niessl.

USTILAGO ZEAE (Beckm.) Unger, Infl. Bodens 211. 1836.

On *Zea mays*, Walla Walla, Walla Walla Co., Wash. Aug. 16, 1915 (Heald, W. S. C. Path. No. C. S. 201); Sunnyside, Yakima Co., Wash. Oct. 19, 1915 (C. C. Farr, W. S. C. Path. I. S. No. 457); Pullman, Whitman Co., Wash. Aug. 29, 1916 (Heald, W. S. C. Path. No. C. S. 409); Oct. 5,

1916 (Heald, W. S. C. Path. C. S. 435); Pullman, Whitman Co., Wash. Jan. 1, 1918 (E. F. Gaines, W. S. C. Path. No. I. S. 1279); Walla Walla Co. and Yakima Co. Wash. Sept., 1918. Becoming somewhat prevalent in these two localities in the state. Prosser, Benton Co., Wash. July 8, 1919 (E. B. Starkey, W. S. C. Path. I. S. 2032).

UROCYSTIS AGROPYRI (Preuss) Schrot. Abh. Schles. Ges. Abth. Nat. Med., 1869-72: 7. 1870.

On "grass leaves," Bingen, Klickitat Co., Wash. May 3 and 28. 1899 (W. N. Suksdorf No. 464).

On *Bromus marginatus*, Port Townsend, Jefferson Co., Wash. Aug. 7, 1919 (Knight).

On *Elymus condensatus*, Isaacs St., Walla Walla, Walla Walla Co., Wash. June 17, 1919; La Conner Flats, Skagit Co., Wash. June 27, 1919.

UROCYSTIS GEI El. & Ev. Bull. Tor. Bot. Club, 27: 572. 1900.

On leaves of *Sieversia ciliata* (*Geum ciliata*), Waitsburg, Walla Walla County, Wash. May 7, 1900 (Robert M. Horner No. 1430) Clinton calls this species *Urocystis Waldsteiniae* Peck.

Besides the smuts reported in the preceding list, the following are reported as occurring in Washington. The author, however, has not been able to locate the collections from which these reports were made, viz.:

USTILAGO MACROSPORA Desmaz.

On *Agropyron spicatum inerme* (North Amer. Flora, 7: 19. 1906).

USTILAGO OLIVACEAE (D. C.) Tul.

On *Carex atriculata* (North Amer. Flora, 7: 12. 1906).

USTILAGO VINOSA (Berk) Tul.

On *Oxyria digyna* (North Amer. Flora, 7: 21. 1906).

TILLETIA AIRAE Blytt.

On *Deschampsia caespitosa* (North Amer. Flora, 7: 49. 1906).

THECAPHORA DEFORMANS Dur. and Mont.

On *Lotus micranthus* (North Amer. Flora, 7: 41-42. 1906).

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